

## ENVIRONMENTAL SCAN

# Public Health Measures and COVID-19 Epidemiology in Select International Jurisdictions (Current up to April 6, 2022)

Published: April 2022

## Key Findings

- Epidemiological trends in Ontario have demonstrated signs of provincial Coronavirus Disease 2019 (COVID-19) resurgence since the end of February 2022. Close monitoring of epidemiological trends since March 21, 2022 (date of mask mandate removal) suggests a corresponding temporal association with a subsequent increase in confirmed COVID-19 cases, percent positivity, and hospitalizations. The full impact of lifting masking and other measures may not yet be observable, given limited PCR testing eligibility and lagging hospitalization data.
- Although most public health measures have been lifted across the included jurisdictions, some continue to require masking in certain settings (i.e., France, Germany, Israel, Italy, Portugal, California, New York), have a health pass system (i.e. France and Italy), or continue to expand vaccine eligibility (i.e., England, Finland, France, Ireland, and the Netherlands).
- Despite similarities in lifting of public health measures, COVID-19 case rates, hospitalizations, and death rates showed different trends (increasing, stable, or decreasing) across the international jurisdictions throughout March 2022. Differences between jurisdictions may be attributable to health system capacity, testing, tracing, and isolation policies.
- All included Canadian provinces have removed capacity limits and proof of vaccination. BC, Saskatchewan, and Manitoba have lifted their mask mandate. Alberta still requires masks on public transit. Quebec announced on April 5, 2022 that their mask-mandate will be extended to at least the end of April 2022 amid a rise in COVID-19 cases and hospitalizations (masks not required in the classroom).
- Resurgence in Ontario may warrant consideration in public health response. Potential actions to mitigate worsening epidemiological trends in morbidity and mortality, societal disruption, and inequities experienced by populations at increased risk of severe disease (e.g., immunocompromised individuals) include timely, temporary re-implementation of public health measures such as indoor masking, and continuation of existing measures such as case and contact management.

## Objectives and Scope

This environmental scan highlights public health measures for select international jurisdictions. It summarizes epidemiological trends (i.e., COVID-19 cases, hospitalizations, and deaths) and additional contextual factors (e.g., vaccination rates and variants of concern [VOCs]) at a high level. Out of scope for this scan was testing and case and contact management strategies which may be an important contextual difference across jurisdictions. In addition, county- and city-level public health measures were out of scope.

## Background

As of March 27, 2022, 85.0% of the total population in Ontario had received at least one dose of a COVID-19 vaccine, and 81.7% of the total population received two doses.<sup>1</sup> The 5 – 11 years age group has the lowest vaccination coverage with only 33.7% fully vaccinated as of April 6, 2022.<sup>2</sup> As of April 8, 2022, 48.6% of the total population in Ontario had received a third dose.<sup>3</sup> Individuals 5 years or older are eligible to complete their primary series of vaccination while individuals 12 years or older who received their second dose at least three months prior are eligible for a booster vaccination.<sup>1,4</sup>

The dominant variant in Ontario is now BA.2.<sup>5</sup> In the most recent reporting, the proportion of whole genome sequencing samples identified as BA.2 in Ontario increased over the past several weeks to 54.0% for March 13 to 19.<sup>5</sup> The rolling 7-day average of daily new COVID-19 cases per 100,000 people slightly decreased throughout the first week of March, at which point it remained relatively stable until March 16, 2022. Since March 17, 2022, Ontario has experienced a sustained increase in the rolling 7-day average of daily new COVID-19 cases per 100,000 people.<sup>6</sup> Confirmed case numbers are an underestimate of the true epidemiology given limited access to molecular and rapid antigen tests (RAT) and no required reporting of positive RATs for the general population.<sup>7</sup> Despite changes to testing, test positivity has shown a fluctuating, but generally increasing trend since the end of February 2022.<sup>6</sup> COVID-19-related hospitalizations including intensive care unit admissions generally decreased in the beginning half of March 2022 followed by an increase in the second half of the month.<sup>8</sup> The number of new COVID-19 related deaths saw a slight increase at the beginning of March followed by a decrease throughout the middle of March, with the 7-day average daily number appearing to stabilize at the end of March at around 10.<sup>8,9</sup> Hospitalizations and death rates are lagging indicators and require additional time to observe their trends following a change in public health measures.<sup>5</sup>

The current epidemiological situation in Ontario is concerning with indications of SARS-CoV-2 resurgence in Ontario. Modelling from the Ontario Science Table demonstrates that wastewater signals stopped declining in Ontario at the end of February and began increasing in early March. Current provisional estimates of wastewater signals in Ontario are above the levels observed during the fifth wave.<sup>8</sup> Further, given the population eligible for PCR-testing since mid-January has not changed, an observed increase in confirmed case counts and test positivity in recent weeks is suggestive that underlying transmission of BA2 in Ontario is increasing.<sup>5</sup>

On March 21, 2022 – after having lifted most of the other public health measures on March 1, 2022 (i.e., capacity limits and proof of vaccination system) – Ontario lifted its mask mandate for most indoor settings. Masks are still required on public transit and in health care and highest risk social service settings (e.g., shelters, retirement homes).<sup>10</sup> Like many jurisdictions, Ontario is navigating the next stage of the COVID-19 pandemic with ongoing levels of sustained community transmission of SARS-CoV-2. Evidence from earlier in the pandemic suggests it takes a median of 8 days after introducing a public health measure to observe 60% of the maximum reduction in the reproduction number (R), and a median of 17 days following relaxation to observe 60% of the maximum increase in R.<sup>11</sup> When public health measures are lifted, there is evidence to support a staged approach, with at least three weeks

before lifting more measures. Tracking public health measures and epidemiology in jurisdictions with similar contexts (e.g., vaccination coverage, type of vaccines, and dominant SARS-CoV-2 variants), may be helpful in order to learn from their experience.

## Methods

This environmental scan reports on accessible information up to April 6, 2022 for select international jurisdictions (i.e., Denmark, England, Finland, France, Germany, Ireland, Israel, Italy, Norway, Portugal, the Netherlands, and United States [US]). Since public health measures are decided at the state-level, the states of California and New York are included as examples from the US. A jurisdictional scan of public health measures and epidemiology in the Canadian provinces of British Columbia (BC), Alberta, Saskatchewan, Manitoba, Quebec, and Prince Edward Island (PEI) was performed.

This scan was informed by previous Public Health Ontario (PHO) reports, scanning of key government websites, as well as general Google searches for items related to public health measures, COVID-19 epidemiology and vaccination coverage. A formal bibliographic database search was not conducted due to time constraints; thus, some relevant articles may not be included.

The public health measures and overall epidemiology of select jurisdictions will be described and their relevance to Ontario will be discussed. For the context of this paper, the terms “immunity pass” (i.e., a system that requires proof of vaccination and/or recovery) and “health pass” (i.e., a system that requires proof of vaccination, recovery, and/or negative test result) will be used. The term “eligibility” refers to which individuals can obtain the pass (e.g., vaccinated, recently recovered from infection, or unvaccinated individuals). “Validity” refers to how long the pass can be used after last vaccination, recovery, or negative test.

Detailed data on week to week case rate, hospitalizations, deaths, and detailed changes to public health measures for jurisdictions included in this scan are available upon request.

## Results

### Summarized Epidemiology and Vaccine Coverage in Select Jurisdictions

- The jurisdictions included in this scan have a high proportion of their total population vaccinated, similar to Ontario, ranging between 74% and 94% receiving at least one dose of a COVID-19 vaccine and between 66% and 92% of the population receiving two doses.<sup>12-15</sup> All jurisdictions are vaccinating all individuals five years and older.<sup>16-27</sup>
- The jurisdictions included in this scan have between 30% and 66.9% of their population receiving an additional dose.<sup>12,15</sup> There are minor differences between jurisdictions regarding eligibility for third and fourth doses, as well as the interval between doses.<sup>16,18,19,28-40</sup> Of the jurisdictions included in this scan, England, Italy, and Denmark have the highest additional dose coverage, at 66.9%, 65% and 62%, respectively.<sup>12,15</sup>
- COVID-19 case rates in March 2022 varied across the jurisdictions:<sup>41-44</sup>
  - England, Finland, and the Netherlands experienced increasing case rates at the beginning of March followed by a decreasing rate towards the end of the month.
  - Denmark, California, and Norway experienced a sustained decrease throughout March.

- New York experienced a relatively stable case rate in the first half of March followed by an increasing case rate later in the month.
- France, Italy, and Germany experienced an increasing case rate throughout March with a plateauing towards the end of the month.
- Israel and Portugal experienced a fluctuating case rate throughout March.
- Ireland experienced a plateauing case rate at the beginning of March followed by a sharp increasing and subsequent decreasing rate towards the end of March.
- The number of COVID-19 patients in hospital in March 2022 varied across the jurisdictions:<sup>43,45-47</sup>
  - England, Finland, and Ireland experienced an increasing number of COVID-19 patients in hospital.
  - California, Denmark, and Israel experienced a fluctuating but decreasing number of COVID-19 patients in hospital throughout March.
  - New York State and Portugal experienced a decreasing number of COVID-19 patients in hospital followed by a plateau later in the month.
  - Netherlands experienced an increasing number of COVID-19 patients in hospital followed by a plateau later in the month.
  - France and Italy experienced a decreasing number of COVID-19 patients in hospital at the beginning of March, followed by a plateau and a subsequent increase later in the month.
  - Norway experienced a relative plateau in the beginning of March followed by a decreasing number of COVID-19 patients in hospital later in the month.
- COVID-19-related death rates in March 2022 varied across the jurisdictions.<sup>43,47-49</sup>
  - England, Norway, and the Netherlands experienced a fluctuating, but increasing death rate.
  - New York State, France, Italy, and Israel experienced a decreasing death rate at the beginning of March with a plateau towards the end of the month.
  - California experienced a decreasing death rate in March.
  - Denmark experienced a fluctuating, but increasing death rate at the beginning of March with a fluctuating, but decreasing rate later in the end of the month.
  - Portugal experienced a fluctuating, but decreasing death rate at the beginning of March with a fluctuating, but increasing rate later in the end of the month.
  - Finland and Ireland experienced a fluctuating death rate with multiple increases and decreases.
  - Germany experienced a plateau throughout most of March followed by an increasing death rate towards the end of the month.
- In the week ending on March 19, 2022, the Omicron variant (B.1.1.529) was the dominant variant across all jurisdictions, accounting for 98.6% to 100% of cases.<sup>50,51</sup>

## Status of Public Health Measures in Select Jurisdictions

The current status of public health measures is described below for each jurisdiction. Most jurisdictions continue to lift public health measures.

### DENMARK

Despite a rising case rate, Denmark reopened public venues on January 16, 2022<sup>52</sup> and lifted all remaining COVID-19 protective measures on February 1, 2022.<sup>53</sup> Effective March 17, 2022, Denmark no longer requires masks in airports nor hospitals, social service, nursing and adult care facilities.<sup>54</sup> As of April 6, 2022, Denmark has no public health measures in place.

### ENGLAND

England gradually lifted public health measures in January 2022 after experiencing a decreasing case rate since January 4, 2022.<sup>55</sup> Effective March 15, 2022, healthcare and social care workers no longer need to be fully vaccinated as a condition of their employment.<sup>56</sup> As of April 6, 2022, England does not have any public health measures in place; however, it is recommended to wear a mask in crowded, enclosed spaces.<sup>57</sup>

### FINLAND

Finland gradually lifted public health measures throughout February 2022.<sup>55</sup> Finland did not change its public health measures since the last scan, which was current up to March 2, 2022. As of April 6, 2022, Finland has the following public health measures in place:<sup>58</sup>

- Masks are recommended on public transport and in all indoor public spaces.
- COVID-19 vaccines are mandatory for health and social care workers.<sup>59,60</sup>

### FRANCE

France continued to ease public health measures in March 2022 including easing mask mandates (i.e., no longer required indoors in most settings) and lifting the use of the immunity pass system.<sup>61</sup> As of April 6, 2022, France has the following public health measures:<sup>61</sup>

- A health pass is required for access to health facilities and places of care.
- Masks are required in health facilities, places of care, and public transit for individuals six years and older.

### GERMANY

Germany lifted most of its public health measures on March 20, 2022 including its mask mandate in most settings and immunity pass system.<sup>39</sup> As of April 6, 2022, Germany has the following public health measures:<sup>62</sup>

- Masks are required in facilities for vulnerable groups and on public transportation.
- Health care workers are required to show proof of vaccination, convalescence, or exemption certificate. Unvaccinated health care workers may be subject to fines and/or bans on activities or entering the workplace.

## IRELAND

Ireland did not change its public health measures since the last scan, which was current up to March 2, 2022. Ireland lifted most of its national public health measures, including a health pass for entry into venues, on January 22, 2022 after experiencing a decreasing case rate since January 12, 2022.<sup>63</sup> On February 28, 2022, Ireland lifted its mask mandate. However, face masks are still recommended on public transportation and in healthcare settings.<sup>63</sup>

## ISRAEL

Israel did not change its public health measures since the last scan, which was current up to March 2, 2022. Israel lifted most of its public health measures on March 1, 2022 (i.e., health pass system, capacity limits).<sup>55</sup> As of April 6, 2022, Israel has the following public health measure:

- Masks are required in all indoor settings.<sup>64</sup>

## ITALY

Italy's state of emergency was lifted on March 31, 2022, which included the lifting of masking in classrooms and easing the use of the immunity pass system.<sup>65,66</sup> It was also announced that the remaining measures will be phased out by May 2022.<sup>65</sup> As of April 6, 2022, Italy has the following public health measures:<sup>67</sup>

- An immunity pass applies to some indoor settings (e.g., gyms and restaurants) for individuals 12 years and older. It has a validity period of six months post second dose and there is no expiration for boosted individuals.<sup>32,68</sup> A health pass is required for personal services and commercial activities (e.g., banks and post offices) and access to the workplace.<sup>65,69</sup>
- Individuals are required to wear FFP2 masks indoors and on public transportation.
- Vaccinations are mandatory for law enforcement, military, healthcare workers, pharmacists, and all school employees.<sup>70,71</sup> There is also a general vaccine mandate for individuals 50 years and older.<sup>72-74</sup> There is a 100 EURO fine for individuals in this age group that are not vaccinated.

## NORWAY

Norway did not change its public health measures since the last scan, which was current up to March 2, 2022. Norway lifted most of its public health measures on February 1, 2022 and its mask mandate on February 12, 2022.<sup>75</sup> As of April 6, 2022, face masks are recommended for at-risk or unvaccinated individuals when infection rates are high (no threshold provided) and when it is difficult to maintain distance from others.<sup>76</sup> No other public health measures are in place.

## PORTUGAL

Portugal did not change its public health measures since the last scan, which was current up to March 2, 2022. Portugal eased public health measures in February including lifting capacity limits and proof of vaccination.<sup>77</sup> As of April 6, 2022, Portugal has the following public health measure:<sup>77,78</sup>

- Face masks are mandatory in all indoor spaces and on public transportation.

On March 22, 2022, it was announced that the following thresholds are needed to be met in order to lift the remaining COVID-19 measures: 20 deaths per million and less than 170 beds in intensive care units for COVID-19 patients.<sup>79</sup>

## THE NETHERLANDS

The Netherlands continued to lift public health measures in March 2022 (i.e., mask mandate on public transportation, pre-admission testing, and recommendation to work from home) after lifting most of its measures in February 2022 (i.e., indoor mask mandate, health pass system, and capacity limits).<sup>80</sup> As of April 6, 2022, the Netherlands has the following public health measures:<sup>81</sup>

- Face masks remain mandatory in airports.
- It is recommended that employers make agreements with staff to allow working from home to continue.

## CALIFORNIA, US

California continued to lift public health measures in March 2022 (i.e., restrictions at indoor mega events) after lifting its indoor mask mandate in February 2022.<sup>82,83</sup> As of April 6, 2022, California has the following public health measures:

- Masks are required on public transportation and in high-density places (e.g., emergency shelters, correctional facilities).<sup>84</sup> Masks are recommended indoors for all individuals, regardless of vaccination status.<sup>82</sup>
- All health care workers and students/staff at some post-secondary schools are required to get the COVID-19 vaccine booster shot.<sup>85</sup>

## NEW YORK STATE, US

New York State did not change its public health measures since the last scan, which was current up to March 2, 2022. New York State eased public health measures in February 2022 including easing its mask mandate and delaying the requirement for health care workers to get booster shots.<sup>86,87</sup> As of April 6, 2022, New York State has the following public health measures:

- Masks are required in high-density places (e.g., health care and correctional facilities, shelters, and transportation).<sup>87</sup>
- Teachers can allow students to study remotely.<sup>88</sup>

## CANADIAN PROVINCES

Canadian provinces (i.e., BC, Alberta, Saskatchewan, Manitoba, Quebec) started to lift public health measures in February 2022.<sup>89-93</sup> Currently, all included provinces have removed capacity limits and proof of vaccination. Despite case counts being an underestimate due to changes to testing strategies, case rates in the included provinces are higher than at most other points since the pandemic began.<sup>94</sup> Since the beginning of March, COVID-19 hospitalizations increased in Saskatchewan, BC and Quebec.<sup>95-97</sup> Masking requirements vary by province and include:

- BC, Manitoba, and Saskatchewan have all lifted their mask mandate.
- Alberta still requires masks on public transportation.
- Quebec requires masks in all indoor settings except for the classroom. In March, Quebec announced that their mask mandate for indoor public settings was expected to be lifted by mid-April; however, the interim director of public health announced on April 5, 2022 that the government has extended the mask-mandate to at least the end of April 2022 amid a rise in COVID-19 cases and hospitalizations.<sup>98</sup>

- PEI extended their mask mandate until at least April 28, 2022 with masking expected to be maintained beyond that date in some higher risk settings (e.g., health care settings, transit).<sup>99</sup>

## Summary of Findings

**Table 1. Overview of Public Health Measures Implemented in Select International Jurisdictions, as of April 6, 2022**

Jurisdiction	Immunity Pass* or Health Pass**	Mask Mandate	Capacity/Gathering Limits	Setting-specific Closures	Remote Work
Denmark	No	No	No	No	No
England	No	Rec	No	No	No
Finland	No	Rec	No	No	No
France	Yes	Yes	No	No	No
Germany	No	Yes	No	No	No
Ireland	No	Rec	No	No	No
Israel	No	Yes	No	No	No
Italy	Yes	Yes	No	No	No
Norway	No	Rec	No	No	No
Portugal	No	Yes	No	No	No
Netherlands	No	No	No	No	Rec
California	No	Yes	No	No	No
New York	No	Yes	No	No	No

**Table Legend:** “Yes” indicates the measure is currently mandated. “Rec” indicates the measure is recommended. “No” indicates the measure is not currently mandated, nor officially recommended.

\*Immunity Pass: a system that requires proof of vaccination and/or recovery.

\*\*Health Pass: a system that requires proof of vaccination, recovery, and/or negative test result.

## Discussion

At the peak of the winter Omicron wave, public health measures were re-implemented in Ontario, and across Canada, to mitigate the threat to critical infrastructure, including acute health care system capacity.<sup>100,101</sup> On March 21, 2022 – after having lifted most other public health measures on March 1, 2022 (i.e., capacity limits and proof of vaccination system) – Ontario lifted its mask mandate for most indoor settings, including schools.<sup>102-104</sup> Epidemiological trends since March 21, 2022 suggests a corresponding temporal association with a subsequent increase in confirmed COVID-19 cases and hospitalizations.<sup>6</sup> Confirmed case counts and the test positivity rate are increasing and currently higher than during much of the pandemic to date and is higher than would be expected if SARS-CoV-2 were endemic.<sup>105,106</sup>

Modelling from 2020 suggests three to four week delay in observing an impact on case rates after lifting public health measures.<sup>11</sup> Real-world data from early 2021 in the US suggests a 45 day delay is needed after lifting mask mandates before an impact on case rates can be observed.<sup>107</sup> Most of the international jurisdictions included in this scan lifted nearly all of their public health measures in February and March 2022, therefore, it is possible that these public health measure changes are beginning to impact case rates, whereas it may be too early to observe an impact on lagging indicators such as hospitalizations and deaths. England and Denmark, the first two included jurisdictions to lift nearly all measures, are now experiencing decreasing case rates after peaking in January and February, respectively. Denmark is experiencing a decreasing number of COVID-19 hospitalizations and a decreasing death rate, while

England is experiencing an increasing number of COVID-19 hospitalizations and an increasing death rate. This report focused solely on reviewing community-level measures such as masking and proof of vaccination systems. Other public health efforts that impact case rates, hospitalizations, and death rates, including testing, tracing, and isolation policies could account for the observed epidemiological differences between jurisdictions. Furthermore, given evidence of less severe acute COVID-19 disease in children and limited vaccine eligibility and uptake, it is possible that cases are increasing among children since restrictions were lifted but these cases will not be picked up in severity indicators such as hospitalizations.

With the lifting of public health measures, the included jurisdictions are emphasizing vaccination with some jurisdictions increasing vaccine eligibility in March 2022 (e.g., England, Finland, France, Ireland, and the Netherlands). Since vaccination and previous infection do not provide sterilizing immunity, a COVID-19 containment strategy that relies entirely on vaccination and previous infection may not contain transmissions.<sup>5</sup> The uncertainty around the prevalence and severity of post-acute COVID-19 syndrome (PACS) and potential impact in children and adults underscores the need to prioritize minimizing the risk of SARS-CoV-2 transmission. The high transmissibility of the Omicron variant sub-lineages combined with other co-circulating VOCs, incomplete vaccination coverage, and waning immunity, can result in Omicron evolution and recombination events. This leads to local recombinants and variants of high consequence such as the XE BA.1/BA.2 recombinant lineage showing a 9.8% growth rate advantage above BA.2 in the UK.<sup>108</sup> If prioritizing prevention of severe acute disease, solely relying on vaccinations is also unlikely to be effective in the Omicron BA.1.1 and BA.2 context, due to the substantially lowered vaccine effectiveness (VE) against these Omicron sub-lineages, waning immunity, and increasing evidence that BA.2 infection results in a higher viral load.<sup>5</sup>

Omicron is the dominant strain in all included jurisdictions. In the context of BA.1 and BA.2, modelling evidence suggests that public health measures must reduce contacts between infectious and susceptible people by 50% (95% CI: 49-50%) and 60% (95% CI: 60-61%) respectively in order to achieve the same effect when compared to the effectiveness of control measures in the Delta context.<sup>109</sup>

Many of the included jurisdictions lifted their public health measures shortly before Ontario lifted its measures. These jurisdictions have all experienced a changing epidemiological context where indicators initially trended in a worsening direction after lifting the measures (i.e., hospitalizations, death rate, and case rates trended upwards) followed by a mixed pattern. Ontario is beginning to experience a similar change where epidemiological indicators are trending in a worsening direction. Since the indoor mask mandate was only removed in Ontario on March 21, 2022, we may not yet be seeing the full effects of this measure change. Further, hospitalizations and death rates are lagging indicators that may suggest further increases will be observed in the near future. Caution should be used in Ontario moving forward with implications for practice provided below.

## Implications For Practice

- As epidemiological trends in Ontario have worsened in recent weeks, mitigation strategies including public health measures can minimize morbidity and mortality (including post-acute COVID-19 syndrome [PACS]) and minimize societal disruption. Increased public health measures can include timely, temporary re-implementation of indoor masking and continuation of existing measures such as case and contact management.<sup>110</sup>
- Changes to testing, reporting, and how variables are defined (e.g., COVID-19 hospitalizations and deaths) have necessitated recalibration of epidemiological models and deeper understanding of new data sources (e.g., wastewater). Triangulation across indicators can provide greater confidence in trends and should continue to be used.
- With limited PCR testing eligibility among children,<sup>7</sup> and given that hospitalization is a lagging indicator and evidence that the majority of children are at low risk of complications from acute infection, there are gaps in surveillance data to inform timely public health action related to Ontario's pediatric population. In the context of a highly transmissible BA.2-dominant wave in Ontario, and given the educational, social and health impacts of cumulative educational disruption for children and families,<sup>111,112</sup> a cautious, temporary approach to re-implementing some less restrictive community-based public health measures can minimize disruption to in-person learning (e.g., due to staying home when infected or symptomatic). Optimizing layers of prevention in K-12 schools, including improved ventilation/air quality, masking indoors, avoiding congregation of large unmasked groups, and access to well-fitted, high quality masks can reduce the risk of in-school transmission and related disruption.<sup>113,114</sup>
- It is important to continuously monitor other jurisdictions, many of which relaxed measures before Ontario, to see if there is any subsequent increase in COVID-19 burden including demand on their health care system. Differences in health system capacity between jurisdictions may mean that removal of the same public health measures leads to a considerable strain on the health system in one jurisdiction but not in another jurisdiction. Jurisdictions may also differ in the burden of disease such as COVID-19-related deaths and long-term effects (e.g., long COVID symptoms) they are willing to tolerate. From a societal perspective, there may be different risk thresholds in terms of COVID-19 infections and burdens placed on particular populations such as young children not eligible for vaccination.

## References

1. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Ontario COVID-19 data tool: vaccines [Internet]. Toronto, ON: Queen's Printer for Ontario; 2021 [cited 2022 Apr 06]. Available from: <https://www.publichealthontario.ca/en/data-and-analysis/infectious-disease/covid-19-data-surveillance/covid-19-data-tool?tab=vaccine>
2. Government of Ontario. COVID-19 vaccinations data [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 06]. Available from: <https://covid-19.ontario.ca/data>
3. COVID-19 Tracker Canada. Ontario vaccination data [Internet]. Ottawa, ON: COVID-19 Tracker Canada; 2022 [cited 2022 Apr 08]. Available from: <https://covid19tracker.ca/provincevac.html?p=ON>
4. Government of Ontario. Getting the COVID-19 vaccine [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 06]. Available from: <https://covid-19.ontario.ca/getting-covid-19-vaccine>
5. Ontario Agency for Health Protection and Promotion (Public Health Ontario). COVID-19 Omicron variant sub-lineage BA.2: evidence and risk assessment (up to date as of April 5, 2022). Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 05]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/voc/covid-19-omicron-risk-assessment.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/nCoV/voc/covid-19-omicron-risk-assessment.pdf?sc_lang=en)
6. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Ontario COVID-19 data tool: case trends [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 05]. Available from: <https://www.publichealthontario.ca/en/data-and-analysis/infectious-disease/covid-19-data-surveillance/covid-19-data-tool?tab=trends>
7. Government of Ontario. Ministry of Health. COVID-19 integrated testing & case, contact and outbreak management interim guidance: Omicron surge [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 02]. Available from: [https://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/docs/contact\\_mgmt/management\\_cases\\_contacts\\_omicron.pdf](https://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/docs/contact_mgmt/management_cases_contacts_omicron.pdf)
8. Science Table COVID-19 Advisory for Ontario. Ontario dashboard: tracking Omicron [Internet]. Toronto, ON: Ontario COVID-19 Science Advisory Table; 2022 [cited 2022 Apr 02]. Available from: <https://covid19-sciencetable.ca/ontario-dashboard/>
9. Government of Ontario. All Ontario: case numbers and spread [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 02]. Available from: <https://covid-19.ontario.ca/data/case-numbers-and-spread>
10. Government of Ontario. COVID-19 public health measures and advice [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 02]. Available from: <https://covid-19.ontario.ca/public-health-measures>
11. Li Y, Campbell H, Kulkarni D, Harpur A, Nundy M, Wang X, et al. The temporal association of introducing and lifting non-pharmaceutical interventions with the time-varying reproduction number (R) of SARS-CoV-2: a modelling study across 131 countries. *Lancet Infect Dis*. 2021;21(2):193-202. Available from: [https://doi.org/10.1016/S1473-3099\(20\)30785-4](https://doi.org/10.1016/S1473-3099(20)30785-4)

12. Holder J. Tracking coronavirus vaccinations around the world. New York Times [Internet], 2022 [cited 2022 Apr 06]; Coronavirus outbreak. Available from: <https://www.nytimes.com/interactive/2021/world/covid-vaccinations-tracker.html>
13. Our World in Data. Share of people who received at least one dose of COVID-19 vaccine [Internet]. Oxford: Global Change Data Lab; 2022 [cited 2021 Apr 06]. Available from: <https://ourworldindata.org/grapher/share-people-vaccinated-covid?time=2021-12-12..latest&country=~England>
14. Our World in Data. Share of the population fully vaccinated against COVID-19 [Internet]. Oxford: Global Change Data Lab; 2022 [cited 2022 Apr 06]. Available from: <https://ourworldindata.org/grapher/share-people-fully-vaccinated-covid?country=~England>
15. UK Health Security Agency. Coronavirus (COVID-19) in the UK: vaccinations in England [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 06]. Available from: <https://coronavirus.data.gov.uk/details/vaccinations?areaType=nation&areaName=England>
16. Denmark. Coronasmitte. Vaccination [Internet]. Copenhagen: Coronasmitte; 2022 [cited 2022 Apr 06]. Available from: <https://coronasmitte.dk/raad-og-regler/vaccination>
17. UK. National Health Service. Coronavirus (COVID-19) vaccines [Internet]. London: Crown Copyright; 2021 [cited 2022 Apr 06]. Available from: <https://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/coronavirus-vaccine/>
18. Finnish Institute for Health and Welfare. Vaccination order and at-risk groups for COVID-19 [Internet]. Helsinki: Finnish Institute for Health and Welfare; 2021 [cited 2022 Apr 06]. Available from: <https://thl.fi/en/web/infectious-diseases-and-vaccinations/what-s-new/coronavirus-covid-19-latest-updates/vaccines-and-coronavirus/vaccination-order-and-at-risk-groups-for-covid-19>
19. Government of France. Vaccines [Internet]. Paris: Government of France; 2022 [cited 2022 Apr 06]. Available from: <https://www.gouvernement.fr/info-coronavirus/vaccins>
20. DPA; The Local. Germany to roll out Covid vaccinations for 5-11 year olds. The Local [Internet], 2021 Dec 13 [cited 2022 Apr 02]; Covid-19. Available from: <https://www.thelocal.de/20211213/germany-to-start-covid-vaccinations-for-5-11-year-olds/>
21. Browne D. Jabby days covid-19 Ireland – children aged 5-11 can get vaccine from today as 16,986 new cases confirmed. Irish Sun [Internet], 2022 Jan 03 [cited 2022 Apr 02]; Irish News. Available from: <https://www.thesun.ie/news/8149666/covid-ireland-new-cases-children-vaccine-hse-steps-parents/>
22. Israel. Ministry of Health. Vaccines [Internet]. Jerusalem: State of Israel; 2022 [cited 2022 Apr 02]. Available from: <https://corona.health.gov.il/en/vaccine-for-covid/over-12/>
23. Wanted in Rome. Italy starts vaccinating kids against covid-19. Wanted in Rome [Internet], 2021 Dec 14 [cited 2022 Apr 02]; Coronavirus in Italy. Available from: <https://www.wantedinrome.com/news/italy-starts-vaccinating-kids-against-covid-19.html>

24. Norwegian Institute of Public Health. Who will get the coronavirus vaccine? [Internet]. Oslo: Norwegian Institute of Public Health; 2020 [modified 2021 Jan 24; cited 2022 Apr 02]. Available from: <https://www.fhi.no/en/id/vaccines/coronavirus-immunisation-programme/who-will-get-coronavirus-vaccine-first/>
25. The Tribune. Portugal starts vaccinating kids amid Omicron variant. The Tribune [Internet], 2021 Dec 19 [cited 2022 Apr 01]; World. Available from: <https://www.tribuneindia.com/news/schools/portugal-starts-vaccinating-kids-amid-omicron-variant-352127>
26. Government of the Netherlands. Dutch vaccination programme against COVID-19 [Internet]. Amsterdam: Government of the Netherlands; 2021 [cited 2022 Apr 01]. Available from: <https://www.government.nl/topics/coronavirus-covid-19/dutch-vaccination-programme>
27. Centers for Disease Control and Prevention. CDC recommends pediatric COVID-19 vaccine for children 5 to 11 years [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2021 [cited 2022 Apr 01]. Available from: <https://www.cdc.gov/media/releases/2021/s1102-PediatricCOVID-19Vaccine.html>
28. UK. National Health Service. Booster dose of the coronavirus (COVID-19) vaccine [Internet]. London: Crown Copyright; 2021 [cited 2022 Apr 01]. Available from: <https://www.nhs.uk/conditions/coronavirus-covid-19/coronavirus-vaccination/coronavirus-booster-vaccine/>
29. Germany. Federal Government. The most important questions and answers about the booster vaccination [Internet]. Berlin: Press and Information Office of the Federal Government; 2021 [cited 2022 Apr 01]. Available from: <https://www.bundesregierung.de/breg-en/news/coronavirus-booster-vaccination-faq-1971332>
30. Ireland. Health Service Executive. COVID-19 vaccine booster dose [Internet]. Dublin: Health Service Executive; 2021 [cited 2022 Apr 01]. Available from: <https://www2.hse.ie/screening-and-vaccinations/covid-19-vaccine/get-the-vaccine/covid-19-vaccine-booster-dose/>
31. Israel. Ministry of Health. Vaccines: fourth vaccine dose [Internet]. Jerusalem: State of Israel; 2022 [cited 2022 Apr 02]. Available from: <https://corona.health.gov.il/en/vaccine-for-covid/4th-dose/>
32. Italy. Ministry of Health. Covid-19, further measures to contain the epidemic [Internet]. Rome: Ministry of Health; 2021 [cited 2022 Apr 01]. Available from: <https://www.salute.gov.it/portale/nuovocoronavirus/dettaglioNotizieNuovoCoronavirus.jsp?lingua=italiano&menu=notizie&p=dalministero&id=5743>
33. Norwegian Institute of Public Health. Coronavirus vaccine - information for the public [Internet]. Oslo: Norwegian Institute of Public Health; 2020 [modified 2022 Feb 28; cited 2022 Apr 02]. Available from: <https://www.fhi.no/en/id/vaccines/coronavirus-immunisation-programme/coronavirus-vaccine/#booster-doses>
34. Portugal. Servico Nacional de Salude. Covid-19 - reinforcement of vaccination [Internet]. Lisbon: Servico Nacional de Salude; 2021 [cited 2022 Apr 01]. Available from: <https://www.sns.gov.pt/noticias/2021/12/23/covid-19-reforco-da-vacinacao-8/>

35. TPN/Lusa. Wait for booster jab shortened. Portugal News [Internet], 2021 Nov 19 [cited 2022 Apr 01]; COVID-19. Available from: <https://www.theportugalnews.com/news/2021-11-19/wait-for-booster-jab-shortened/63652>
36. Government of the Netherlands. Who can get a booster vaccination and when? [Internet]. Amsterdam: Government of the Netherlands; 2022 [cited 2022 Apr 02]. Available from: <https://www.government.nl/topics/coronavirus-covid-19/dutch-vaccination-programme/booster-vaccination>
37. Aboulenein A, Banerjee A. U.S. FDA authorizes Pfizer's COVID-19 booster for 12- to 15-year-olds. Reuters [Internet], 2022 Jan 03 [cited 2022 Apr 01]; Future of health. Available from: <https://www.reuters.com/business/healthcare-pharmaceuticals/us-fda-clears-pfizers-covid-19-booster-shot-12-15-year-olds-2022-01-03/>
38. UK Health Security Agency. JCVI advises a spring COVID-19 vaccine dose for the most vulnerable [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 02]. Available from: <https://www.gov.uk/government/news/jcvi-advises-a-spring-covid-19-vaccine-dose-for-the-most-vulnerable>
39. Deutschland.de. The Federal Government informs about the corona crisis [Internet]. Berlin: Deutschland.de; 2022 [cited 2022 Apr 02]. Available from: <https://www.deutschland.de/en/news/german-federal-government-informs-about-the-corona-crisis>
40. NL Times Staff. Dutch health service starts administering second Covid booster shots. NL Times [Internet], 2022 Mar 04 [cited 2022 Apr 02]. Available from: <https://nltimes.nl/2022/03/04/dutch-health-service-starts-administering-second-covid-booster-shots>
41. Our World in Data. Daily new confirmed COVID-19 cases per million people [Internet]. Oxford: Global Change Data Lab; 2021 [cited 2022 Apr 06]. Available from: <https://ourworldindata.org/covid-cases>
42. UK Health Security Agency. Coronavirus (COVID-19) in the UK: cases in England [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 06]. Available from: <https://coronavirus.data.gov.uk/details/cases?areaType=nation&areaName=England>
43. California All. Tracking COVID-19 in California [Internet]. Sacramento, CA: State of California; 2021 [modified 2022 Mar 02; cited 2022 Apr 06]. Available from: <https://covid19.ca.gov/state-dashboard/>
44. New York State. Positive tests over time, by region and county [Internet]. Albany, NY: New York State; 2021 [cited 2022 Apr 06]. Available from: <https://coronavirus.health.ny.gov/positive-tests-over-time-region-and-county>
45. Our World in Data. Number of COVID-19 patients in hospital [Internet]. Oxford: Global Change Data Lab; 2021 [cited 2022 Apr 06]. Available from: <https://ourworldindata.org/covid-hospitalizations>
46. UK Health Security Agency. Coronavirus (COVID-19) in the UK: healthcare in England [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 06]. Available from: <https://coronavirus.data.gov.uk/details/healthcare?areaType=nation&areaName=England>

47. New York Times. Tracking coronavirus in New York: latest map and case count. New York Times [Internet], 2022 Jan 01 [cited 2022 Apr 06]; Covid-19. Available from: <https://www.nytimes.com/interactive/2021/us/new-york-covid-cases.html>
48. Our World in Data. Daily new confirmed COVID-19 deaths per million people [Internet]. Oxford: Global Change Data Lab; 2022 [cited 2022 Apr 06]. Available from: <https://ourworldindata.org/covid-deaths>
49. UK Health Security Agency. Coronavirus (COVID-19) in the UK: deaths in England [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 06]. Available from: <https://coronavirus.data.gov.uk/details/deaths?areaType=nation&areaName=England>
50. GISAID. Tracking of variants [Internet]. Munich: Freunde von GISAID; 2021 [cited 2022 Apr 06]. Available from: <https://www.gisaid.org/hcov19-variants/>
51. European Centre for Disease Prevention and Control. SARS-CoV-2 variants dashboard [Internet]. Stockholm: European Centre for Disease Prevention and Control; 2022 [cited 2022 Apr 06]. Available from: <https://www.ecdc.europa.eu/en/covid-19/situation-updates/variants-dashboard>
52. ABC 8 News. Denmark lifts COVID restrictions, opens many public venues. ABC 8 News [Internet], 2022 Jan 16 [cited 2022 Apr 02]; U.S. and World Business News. Available from: <https://www.wric.com/business/us-world-business/denmark-lifts-covid-restrictions-opens-many-public-venues/>
53. Coronasmitte. Rules and regulations [Internet]. Copenhagen: Coronasmitte; 2022 [cited 2022 Apr 02]. Available from: <https://en.coronasmitte.dk/rules-and-regulations>
54. Coronasmitte. Prevent infection [Internet]. Copenhagen: Coronasmitte; 2021 [cited 2022 Apr 02]. Available from: <https://en.coronasmitte.dk/general-information/prevent-infection>
55. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Public health measures and COVID-19 epidemiology in select international jurisdictions (current up to March 2, 2022) [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 02]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/epi/2022/02/env-scan-changes-phm-epi-select-jurisdictions-mar-2.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/nCoV/epi/2022/02/env-scan-changes-phm-epi-select-jurisdictions-mar-2.pdf?sc_lang=en)
56. UK Health Security Agency. Regulations making COVID-19 vaccination a condition of deployment to end [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 02]. Available from: <https://www.gov.uk/government/news/regulations-making-covid-19-vaccination-a-condition-of-deployment-to-end>
57. UK Health Security Agency. England returns to Plan A as regulations on face coverings and COVID passes change today [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 02]. Available from: <https://www.gov.uk/government/news/england-returns-to-plan-a-as-regulations-on-face-coverings-and-covid-passes-change-today>
58. Finland. Restrictions during the coronavirus epidemic [Internet]. Helsinki: Finnish Government; 2022 [cited 2022 Apr 02]. Available from: <https://valtioneuvosto.fi/en/information-on-coronavirus/current-restrictions>

59. Yle News. Finland introduces mandatory Covid vaccinations for healthcare workers. Yle News [Internet], 2022 Dec 29 [cited 2022 Apr 02]. Available from: <https://yle.fi/news/3-12249108>
60. Finland. Ministry of Social Affairs and Health. COVID-19 vaccines [Internet]. Helsinki: Finnish Government; 2022 [cited 2022 Apr 02]. Available from: <https://stm.fi/en/coronavirus-vaccines>
61. Government of France. Coronavirus information: situation update [Internet]. Paris: Government of France; 2022 [cited 2022 Apr 02]. Available from: <https://www.gouvernement.fr/info-coronavirus>
62. Deutschland.de. Latest coronavirus updates [Internet]. Berlin: Deutschland.de; 2022 [cited 2022 Apr 02]. Available from: <https://www.deutschland.de/en/news/coronavirus-in-germany-information>
63. Government of Ireland, Department of the Taoiseach. Government announces that most of the public health measures currently in place can be removed [Internet]. Dublin: Government of Ireland; 2022 [cited 2022 Apr 02]. Available from: <https://www.gov.ie/en/press-release/Ofc0d-government-announces-that-most-of-the-public-health-measures-currently-in-place-can-be-removed/?referrer=http://www.gov.ie/en/publication/3361b-public-health-updates/>
64. Israel. Ministry of Health. Routine during the COVID-19 pandemic [Internet]. Jerusalem: State of Israel; 2022 [cited 2022 Apr 02]. Available from: <https://www.gov.il/en/departments/general/routine-during-covid-pandemic>
65. Government of Italy. Press release of the Council of Ministers n. 67 [Internet]. Rome: Government of Italy; 2022 [cited 2022 Apr 02]. Available from: <https://www.governo.it/it/articolo/comunicato-stampa-del-consiglio-dei-ministri-n-67/19412>
66. Government of Italy. Covid-19, PM Draghi: the Government does not intend to extend the state of emergency [Internet]. Rome: Government of Italy; 2022 [cited 2022 Apr 02]. Available from: <https://www.governo.it/en/articolo/covid-19-pm-draghi-government-does-not-intend-extend-state-emergency/19225>
67. Italia. COVID-19: general provisions [Internet]. Rome: National Tourist Board; 2022 [modified 2022 Mar 31; cited 2022 Apr 01]. Available from: <https://www.italia.it/en/covid19>
68. Salisbury J. Italy changes vaccine pass rules in relief for British holidaymakers. Evening Standard [Internet], 2022 Feb 04 [cited 2022 Apr 02]; World. Available from: <https://www.standard.co.uk/news/world/italy-holidays-tourism-uk-britain-vaccine-green-pass-covid-b980686.html>
69. Government of Italy. COVID-19 green certification: EU digital COVID certified [Internet]. Rome: Government of Italy; 2022 [cited 2022 Apr 02]. Available from: <https://www.dgc.gov.it/web/>
70. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Changes to public health measures and COVID-19 epidemiology in select jurisdictions (current up to November 29, 2021) [Internet]. Toronto, ON: Queen's Printer for Ontario; 2021 [cited 2022 Apr 01]. Available from: [https://www.publichealthontario.ca/-/media/documents/ncov/env-scan-changes-phm-epi-select-jurisdictions.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/documents/ncov/env-scan-changes-phm-epi-select-jurisdictions.pdf?sc_lang=en)
71. Messia H, Borghese L, Smith-Spark L. Italy makes vaccines compulsory for health workers. But some are unconvinced. CNN [Internet], 2021 Apr 02 [cited 2022 Apr 02]; World. Available from: <https://edition.cnn.com/2021/04/02/europe/italy-vaccines-health-workers-decree-intl-cmd/index.html>

72. Italy. Ministry of Health. Covid-19, vaccination obligation from 50 years of age [Internet]. Rome: Ministry of Health; 2022 [cited 2022 Apr 01]. Available from: <https://www.salute.gov.it/portale/nuovocoronavirus/dettaglioNotizieNuovoCoronavirus.jsp?lingua=italiano&menu=notizie&p=dalministero&id=5754>
73. Wanted in Rome. Italy's covid Green Pass rules change on 1 February. Wanted in Rome [Internet], 2022 Feb 01 [cited 2022 Apr 02]; Coronavirus in Italy. Available from: <https://www.wantedinrome.com/news/italy-new-covid-green-pass-rules-1-february.html>
74. The Local Staff. 'This is not over': what do experts think of Italy's Covid reopening plan? The Local [Internet], 2022 Mar 21 [cited 2022 Apr 02]; COVID-19 Rules. Available from: <https://www.thelocal.it/20220321/italys-covid-reopening-timeline-what-do-the-experts-think/>
75. Government of Norway. The Norwegian Government is removing a large number of coronavirus measures [Internet]. Oslo: Government of Norway; 2022 [cited 2022 Apr 02]. Available from: <https://www.regjeringen.no/en/aktuelt/the-norwegian-government-is-removing-a-large-number-of-coronavirus-measures/id2899220/>
76. Government of Norway. National recommendations and rules [Internet]. Oslo: Government of Norway; 2021 [cited 2022 Apr 01]. Available from: <https://www.regjeringen.no/en/topics/koronavirus-covid-19/national-recommendations-and-rules/id2890588/>
77. Portugal. Servico Nacional de Salude. Covid-19: new measures [Internet]. Lisbon: Servico Nacional de Salude; 2022 [cited 2022 Apr 02]. Available from: <https://www.sns.gov.pt/noticias/2022/02/17/covid-19-novas-medidas-3/>
78. Visit Portugal. COVID-19 | Measures implemented in Portugal [Internet]. Lisbon: Visit Portugal; 2022 [cited 2022 Apr 01]. Available from: <https://www.visitportugal.com/en/content/covid-19-measures-implemented-portugal>
79. Portugal. Servico Nacional de Salude. Covid-19: relief of restrictions [Internet]. Lisbon: Servico Nacional de Salude; 2022 [cited 2022 Apr 02]. Available from: <https://www.sns.gov.pt/noticias/2022/03/22/covid-19-alivio-das-restricoes/>
80. Government of the Netherlands. 3 steps to reopen the Netherlands [Internet]. Amsterdam: Government of the Netherlands; 2022 [cited 2022 Apr 02]. Available from: <https://www.government.nl/topics/coronavirus-covid-19/news/2022/02/15/3-steps-to-reopen-the-netherlands>
81. Government of the Netherlands. Coronavirus measures and advice in brief [Internet]. Amsterdam: Government of the Netherlands; 2022 [cited 2022 Apr 02]. Available from: <https://www.government.nl/topics/coronavirus-covid-19/tackling-new-coronavirus-in-the-netherlands/coronavirus-measures-in-brief>
82. Money L, Lin R-G, Blume H. California to lift school mask mandate after March 11. Los Angeles Times [Internet], 2022 Feb 28 [cited 2022 Apr 02]; California. Available from: <https://www.latimes.com/california/story/2022-02-28/california-to-lift-school-mask-mandate-after-march-11>

83. Stelloh T. California to let indoor mask mandate expire for vaccinated people. NBC News [Internet], 2022 Feb 7 [cited 2022 Apr 02]; Coronavirus. Available from: <https://www.nbcnews.com/news/us-news/california-let-indoor-mask-mandate-expire-vaccinated-people-rcna15276>
84. California Department of Public Health. Guidance for the use of face masks [Internet]. Sacramento, CA: Government of California; 2022 [cited 2022 Apr 07]. Available from: <https://www.cdph.ca.gov/programs/CID/DCDC/Pages/COVID-19/guidance-for-face-coverings.aspx>
85. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Public health measures and COVID-19 epidemiology in select jurisdictions (current up to January 4, 2022) [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 01]. Available from: [https://www.publichealthontario.ca/-/media/documents/ncov/epi/2022/01/env-scan-changes-phm-epi-select-jurisdictions-jan-4.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/documents/ncov/epi/2022/01/env-scan-changes-phm-epi-select-jurisdictions-jan-4.pdf?sc_lang=en)
86. Eyewitness News. COVID Omicron news: U.S. looking at possibility of fourth vaccine dose for some. Eyewitness News [Internet], 2022 Feb 20 [cited 2022 Apr 02]; Coronavirus. Available from: <https://abc7ny.com/covid-vaccines-fourth-shot-new-york-vaccine-mandate/11583089/>
87. New York State. Governor Hochul announces winter toolkit for new phase of COVID response: keep New York safe, open and moving forward [Internet]. Albany, NY: New York State; 2022 [cited 2022 Apr 02]. Available from: <https://www.governor.ny.gov/news/governor-hochul-announces-winter-toolkit-new-phase-covid-response-keep-new-york-safe-open-and>
88. Chang S. NYC education department quietly opens door for teachers to allow more remote learning. Gothamist [Internet], 2022 Jan 14 [cited 2022 Apr 02]; News. Available from: <https://gothamist.com/news/nyc-education-department-quietly-opens-door-teachers-allow-more-remote-learning>
89. Government of Alberta. COVID-19 public health actions [Internet]. Edmonton, AB: Government of Alberta; 2022 [cited 2022 Apr 04]. Available from: <https://www.alberta.ca/covid-19-public-health-actions.aspx>
90. Bernhardt D. Manitoba to drop capacity limits next week, eliminate mask mandates by mid-March. CBC News [Internet], 2022 Feb 11 [cited 2022 Apr 04]. Available from: <https://www.cbc.ca/news/canada/manitoba/manitoba-covid-19-pandemic-restrictions-1.6347862>
91. Government of Saskatchewan. Public health measures [Internet]. Regina, SK: Government of Saskatchewan; 2022 [cited 2022 Apr 04]. Available from: <https://www.saskatchewan.ca/government/health-care-administration-and-provider-resources/treatment-procedures-and-guidelines/emerging-public-health-issues/2019-novel-coronavirus/public-health-measures>
92. Government of British Columbia. Province-wide restrictions [Internet]. Victoria, BC: Government of British Columbia; 2022 [cited 2022 Apr 04]. Available from: <https://www2.gov.bc.ca/gov/content/covid-19/info/restrictions#restaurants-bars>
93. Government of Quebec. Guidelines specific to education (COVID-19) [Internet]. Quebec City, QC: Government of Quebec; 2022 [cited 2022 Apr 04]. Available from: <https://www.quebec.ca/en/education/guidelines-education-covid>

94. Public Health Agency of Canada. COVID-19 daily epidemiology update [Internet]. Ottawa, ON: Government of Canada; 2022 [cited 2022 Apr 04]. Available from: <https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html#a1>
95. Government of Saskatchewan. COVID-19 integrated epidemiology situation report - week of March 13-19, 2022 [Internet]. Regina, SK: Government of Saskatchewan; 2022 [cited 2022 Apr 05]. Available from: <https://publications.saskatchewan.ca/#/products/117371>
96. Government of British Columbia. COVID-19 pandemic update [Internet]. Victoria, BC: Government of British Columbia; 2022 [cited 2022 Apr 05]. Available from: <https://news.gov.bc.ca/releases/2022HLTH0104-000454>
97. CBC News. COVID-19 in Quebec: what you need to know Tuesday. CBC [Internet], 2022 Mar 29 [cited 2022 Apr 04]; Montreal. Available from: <https://www.cbc.ca/news/canada/montreal/covid-19-quebec-march-29-1.6400838>
98. Jadah T. Face masks will remain mandatory in Quebec until the end of April. DH News [Internet], 2022 Apr 05 [cited 2022 Apr 05]. Available from: <https://dailyhive.com/montreal/face-masks-quebec>
99. Yarr K. P.E.I. keeping mask mandates, but some pandemic restrictions ending. CBC [Internet], 2022 Apr 05 [cited 2022 Apr 05]; PEI. Available from: <https://www.cbc.ca/news/canada/prince-edward-island/pei-pandemic-briefing-april-5-1.6408572>
100. Public Health Agency of Canada. Government of Canada announces additional measures to contain the spread of the Omicron variant [Internet]. Ottawa, ON: Government of Canada; 2021 [cited 2022 Apr 04]. Available from: <https://www.canada.ca/en/public-health/news/2021/12/government-of-canada-announces-additional-measures-to-contain-the-spread-of-the-omicron-variant.html>
101. Government of Ontario. Ontario taking action to protect against Omicron variant [Internet]. Toronto, ON: Queen's Printer for Ontario; 2021 [cited 2022 Apr 05]. Available from: <https://news.ontario.ca/en/release/1001327/ontario-taking-action-to-protect-against-omicron-variant>
102. Ontario. Office of the Premier. Ontario moving to next phase of reopening on February 17 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 04]. Available from: <https://news.ontario.ca/en/release/1001600/ontario-moving-to-next-phase-of-reopening-on-february-17>
103. Government of Ontario. Statement from Ontario's Chief Medical Officer of Health [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 04]. Available from: <https://news.ontario.ca/en/statement/1001732/statement-from-ontarios-chief-medical-officer-of-health>
104. Government of Ontario. Living with and managing COVID-19: technical media briefing [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 04]. Available from: <https://files.ontario.ca/moh-living-with-and-managing-covid-19-technical-media-briefing-en-2022-03-09-v2.pdf>
105. Science Table COVID-19 Advisory for Ontario. Key indicators for Ontario [Internet]. Toronto, ON: Ontario COVID-19 Science Advisory Table; 2022 [cited 2022 Apr 05]. Available from: <https://covid19-sciencetable.ca/wp-content/uploads/2022/04/2022-04-05-Current-Status.png>.

106. Government of Ontario. COVID-19: epidemiologic summaries from Public Health Ontario [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 04]. Available from: <https://covid-19.ontario.ca/covid-19-epidemiologic-summaries-public-health-ontario>.
107. Adjodah D, Dinakar K, Chinazzi M, Fraiberger SP, Pentland A, Bates S, et al. Association between COVID-19 outcomes and mask mandates, adherence, and attitudes. PLoS One. 2021;16(6):e0252315. Available from: <https://doi.org/10.1371/journal.pone.0252315>
108. UK Health Security Agency. SARS-CoV-2 variants of concern and variants under investigation in England: technical briefing 39 [Internet]. London: Crown Copyright; 2022 [cited 2022 Apr 06]. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1063424/Tech-Briefing-39-25March2022\\_FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063424/Tech-Briefing-39-25March2022_FINAL.pdf)
109. Ito K, Piantham C, Nishiura H. Estimating relative generation times and relative reproduction numbers of Omicron BA.1 and BA.2 with respect to Delta in Denmark. medRxiv 22271767 [Preprint]. 2022 Mar 04 [cited 2022 Apr 04]. Available from: <https://doi.org/10.1101/2022.03.02.22271767>
110. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Omicron in Ontario: risk analysis for approaching public health measures in winter 2022 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 04]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/phm/2022/01/covid-19-omicron-ontario-risk-analysis.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/nCoV/phm/2022/01/covid-19-omicron-ontario-risk-analysis.pdf?sc_lang=en).
111. Science Table COVID-19 Advisory for Ontario. Ontario returns to school: an overview of the science [Internet]. Toronto, ON: Ontario COVID-19 Science Advisory Table; 2022 [cited 2022 Apr 05]. Available from: [https://covid19-sciencetable.ca/wp-content/uploads/2022/01/Ontario>Returns-to-School-An-Overview-of-the-Science\\_20220112-1.pdf](https://covid19-sciencetable.ca/wp-content/uploads/2022/01/Ontario>Returns-to-School-An-Overview-of-the-Science_20220112-1.pdf)
112. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Update on approach to adapting public health measures in schools [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 05]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/sch/2022/03/update-adapting-public-health-measures-schools.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/nCoV/sch/2022/03/update-adapting-public-health-measures-schools.pdf?sc_lang=en)
113. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Review of "School masking policies and secondary SARS-CoV-2 transmission" [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 05]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/Research/2022/03/synopsis-boutzoukas-pediatrics-school-masking-policies.pdf?sc\\_lang=en&hash=508CB6638EEA3B936814F44FBF4F7E56](https://www.publichealthontario.ca/-/media/Documents/nCoV/Research/2022/03/synopsis-boutzoukas-pediatrics-school-masking-policies.pdf?sc_lang=en&hash=508CB6638EEA3B936814F44FBF4F7E56)
114. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Mask-wearing in children and COVID-19...what we know so far [Internet]. Toronto, ON: Queen's Printer for Ontario; 2022 [cited 2022 Apr 05]. Available from: [https://www.publichealthontario.ca/-/media/Documents/nCoV/COVID-WWKSF/2021/08/wwksf-wearing-masks-children.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/nCoV/COVID-WWKSF/2021/08/wwksf-wearing-masks-children.pdf?sc_lang=en)

## Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Public health measures and COVID-19 epidemiology in select international jurisdictions (current up to April 6, 2022). Toronto, ON: Queen's Printer for Ontario; 2022.

## Disclaimer

This document was developed by Public Health Ontario (PHO). PHO provides scientific and technical advice to Ontario's government, public health organizations and health care providers. PHO's work is guided by the current best available evidence at the time of publication. The application and use of this document is the responsibility of the user. PHO assumes no liability resulting from any such application or use. This document may be reproduced without permission for non-commercial purposes only and provided that appropriate credit is given to PHO. No changes and/or modifications may be made to this document without express written permission from PHO.

## Public Health Ontario

Public Health Ontario is an agency of the Government of Ontario dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. Public Health Ontario links public health practitioners, front-line health workers and researchers to the best scientific intelligence and knowledge from around the world.

For more information about PHO, visit [publichealthontario.ca](https://publichealthontario.ca).

©Queen's Printer for Ontario, 2022

Ontario 